TWO NEW DICYNODONTS FROM THE TRIASSIC YERRAPALLI FORMATION OF CENTRAL INDIA

by TAPAN ROY CHOWDHURY

ABSTRACT. Two new dicynodonts recently collected from the Triassic Yerrapalli formation of India are described. The first, *Rechnisaurus cristarhynchus*, is a stahleckeriid and the first of its kind to be reported from Asia. *Rechnisaurus* shows considerable similarities to *Dinodontosaurus* of the Middle Triassic of Brazil and Argentina. The second dicynodont, *Wadiasaurus indicus* is the first kannemeyeriid to be described from India and its nearest relative is thought to be *Sangusaurus* of the Middle Triassic of Zambia.

UNTIL recently the only dicynodont reptile known from India was *Lystrosaurus*, reported from the Panchet formation of the Damodar valley Gondwanas (Robinson 1958). This dicynodont is now known from a large number of skulls and associated postcranial material and shows a close resemblance to the South African *Lystrosaurus* (Tripathi and Satsangi 1963). The occurrence of a second dicynodont reptile from India was noticed recently by Jain, Robinson, and Roy Chowdhury (1964) from the Gondwanas of the Parnhita-Godavari valley. This relatively large dicynodont was represented by the anterior ends of the lower jaws, fragments of maxillae and of basicrania, and several postcranial bones. Somewhat resembling *Kannemeyeria*, it was found in a red clay horizon overlying the Permo-Triassic Kamthi formation and which was separated from the overlying fossiliferous Upper Triassic Maleri formation by a sandstone horizon devoid of any fossil remains. This large dicynodont was found associated with a large thecodont reptile (a possible erythrosuchid), a moderately large theriodont reptile and two labyrinthodont amphibians (one was possibly a capitosaur, the other perhaps a brachyopid), thus revealing an altogether new fauna for this sub-continent. Prompted by this discovery, Jain *et al.* (1964) suggested a new formation name, the Yerrapalli formation, for the clay belt from which this new fauna was found, and tentatively suggested that this is comparable in age to the *Cynognathus* zone of the South African Karroo or possibly a little later. The barren sandstone belt immediately above the Yerrapalli formation was named the Bhimaram (sometimes spelt Bheemaram) sandstone.

The Yerrapalli fauna was first noted from an isolated outcrop of Gondwana rocks near Chinur, lying south of the main outcrop belt of Upper Gondwana formations around Maleri and Achlapur and separated from the main outcrop by an oblique fault. In 1964 when Dr. P. L. Robinson visited the main outcrop belt with Dr. E. H. Colbert and the author, she picked up some dicynodont tusks and skull bones from a red clay horizon lying south of Achlapur. Since dicynodonts are unknown in the overlying Upper Triassic fauna of the Maleri formation, these fragments indicated the presence of a distinct fauna. Chatterjee (1967) subsequently mapped the area around Achlapur and proved beyond doubt that the same geological sequence occurs in the main outcrop area as in the more southerly Chinur area. 'Immediately above the Kamthi rocks a red clay belt, with sandstones, contains representatives of the Yerrapalli fauna. Above this clay belt lies a continuous band of sandstone equivalent to Bhimaram sandstone of the

[Palaeontology, Vol. 13, Part 1, 1970, pp. 132–44.]

Chinur area. This sandstone band is succeeded by the true Maleri formation in which excellent specimens of the Upper Triassic vertebrate fauna have been found' (Chatterjee 1967, p. 40).

The dicynodonts described in this paper were collected from red clays of the Yerrapalli formation by the field party of the Geological Studies Unit, Indian Statistical Institute, during field trips of 1964 and 1965. The material consists of two skulls and many postcranial bones, but no skeleton, complete or partial, could be obtained. One skull described here as a new genus and species, *Rechnisaurus cristarhynchus*, was found in the northern area near Rechni village. The second skull, also belonging to a new genus and species described here as *Wadiasaurus indicus*, was excavated from the red clays of the southern area near Yerrapalli village. A large number of postcranial bones were also found in the latter locality but not in actual association with the skull. As it appears that two distinct genera of dicynodonts are present in the Yerrapalli formation, no attempt has been made to relate the postcranial bones to either of these two genera at present, and their description has been deferred until associated material is discovered.

SYSTEMATIC DESCRIPTIONS

Genus RECHNISAURUS gen. nov.

Derivation of name. The genus has been named after the village near which it was discovered.

Type species. *Rechnisaurus cristarhynchus* sp. nov.

Diagnosis. As for sole species at present.

Rechnisaurus cristarhynchus sp. nov.

Text-figs. 1–3

Derivation of name. This refers to the presence of a strong median ridge in the nasal region of the skull.

Material. The holotype skull only; specimen I.S.I.R.37 in the collection of the Geological Museum, Indian Statistical Institute, Calcutta.

Type locality. One kilometre south of Rechni, Pranhita Godavari valley, Andhra Pradesh, India.

Horizon. Yerrapalli formation of the Gondwana Group, Triassic.

Diagnosis. Dicynodont of moderately large size. Skull about 38 cm. long. Large canine teeth. Wide interorbital region. Blunt snout. Strong median ridge on anterior and dorsal surfaces of premaxilla which continues on dorsal surface of nasal; on either side of the ridge lies a pair of deep depressions. Powerful antero-ventrally directed caniniform process bearing rugose rounded flange on its postero-ventral edge. Short postorbital region. Short and wide temporal opening. Fairly narrow intertemporal bar, dorsally concave in cross section. No high parietal crest. Low boss immediately behind pineal foramen. Parietal forms most of the intertemporal bar. Sharp transition between dorsal and occipital surface.

The material and its preservation: The skull was found partly exposed in the red clays and was just beginning to disintegrate on a 'nala' (gully) slope. Parts of the skull were actually found on the 'nala' bed, a little removed from their original place, but could be fitted on to the skull. Most of the occiput and the zygomatic arches were probably washed away and could not be found. The preorbital half of

the skull is almost complete and only very slightly distorted. There is a break, however, along the suture between the premaxilla and the nasal, and the antero-lateral part of the nasal, where it forms the dorsal border of the nostril, is missing; the rest of the narial border is well preserved and the missing part could be restored quite easily. Similarly the anterior border of both the orbits is also broken and parts of the prefrontals, lacrymals, jugals, and squamosals, forming these borders, are missing and have been restored in dotted outline in the illustrations. Behind the orbits, there is a transverse break in front of the pineal foramen with some fitting surfaces to help restoration. Most of the superficial part of the interparietal bone is missing but the rest of the intertemporal bar is well preserved. The zygomatic arches are broken a little behind the maxillae, but the well-preserved post-orbital bar helps in restoring the continuation of the suborbital bar up to the orbit and also indicates the position of the more posterior extension of the zygomatic bar. The braincase and the central part of the palate are more or less well-preserved. In the occiput, only the condyle, the foramen magnum and the median part of the supra-occipital are preserved, with a minor break above the condyle. The squamosals are missing save for an isolated piece near the dorsal part of the lateral wing of the right squamosal. The quadrates and quadratojugals are not present. Only the symphysial part of the lower jaw was found.

Description of the skull

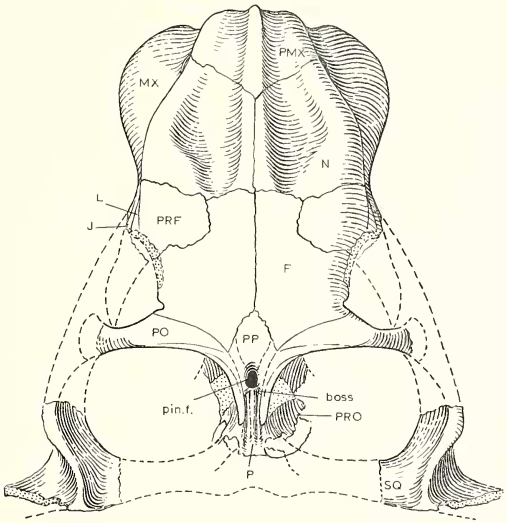
Dorsal view (text-fig. 1). The skull is massive and appears to have been quite broad and triangular in outline. The top of the snout is wide and there is a strong median ridge running from the tip of the snout, gradually widening and dying out behind the nasal-frontal suture. On either side of the ridge lies a pair of deep depressions which become wider posteriorly as the snout broadens; these depressions terminate where the nasals meet the frontals and prefrontals. The front of the snout is wide and blunt. The sides of the snout fall sharply vertically, and thus the external nostrils do not appear in the dorsal view of the skull. The nasals are fairly large bones with a long midline suture. The premaxilla is rather short and wide with a strongly rugose surface. The orbits are separated by the large frontals and are bordered dorsally by prefrontals, frontals, and post-orbitals. The post-orbital bar has rather delicate proportions for such a massive skull, and the post-orbital bone overlaps the parietal strongly by a process directed posteriorly along the lateral edge of the intertemporal bar.

The preparietal bone is small, and only its anterior and posterior parts are preserved, for in this region the specimen has a break in the skull roof which obscures the contact between the frontal and the parietal, lateral to the preparietal. The pineal foramen is rather small, 12 mm. long and 8 mm. wide and is quite deep. There is certainly an abrupt elevation of the level of the skull roof just behind the pineal foramen. The pineal foramen is bordered anteriorly by the preparietal and otherwise by the parietals.

The temporal opening must have been quite short as is evident by the short intertemporal bar, almost exclusively formed by the parietals. The intertemporal bar is narrow; the paired parietals meet at a long midline suture behind the pineal foramen and each has a raised lateral edge, thus making the dorsal face of the bar concave in section. There is a low but prominent median boss immediately behind the pineal foramen. At the posterior end of the parietal, on its lateral surface, the squamosal is preserved only as a broken patch of bone forming a sutural contact. Another dissociated fragment of the lateral wing of the squamosal is also present, but does not give any useful information except to locate the postero-lateral border of the temporal opening.

Ventral view (text-fig. 2). The secondary palate, formed almost entirely by the premaxilla, is rather short and its plane is set at an angle to rest of the palate, giving an arched shape for the ventral surface of the skull.

A pair of palatal ridges runs back from the tip of the premaxilla to converge into a median ridge about halfway along the secondary palate. The vomer is not preserved, but presumably continued the median ridge posteriorly on to the palate. Laterally the premaxilla is strongly overlapped by the maxilla; the latter bone is drawn out laterally into

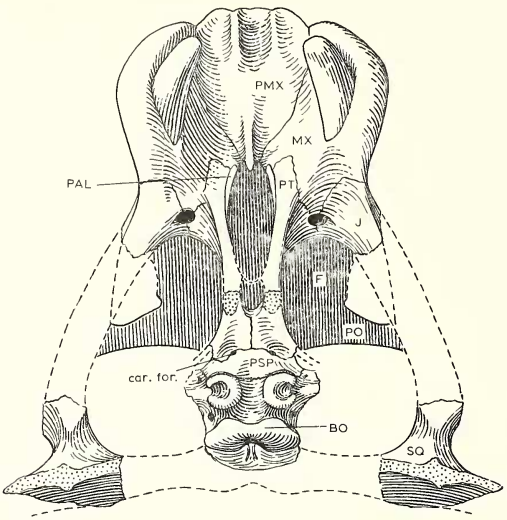


TEXT-FIG. 1. *Rechnisaurus cristarhynchus*, holotype. Dorsal view of skull, $\times\frac{1}{4}$ (for abbreviations, see pp. 143–4).

a very strong caniniform process, as already mentioned. The powerful tusks have their roots quite posteriorly placed in the maxillae, and are curved slightly inwards. Posteriorly the maxilla is bounded laterally by the jugal and medially by the pterygoid; there is a large lateral fenestra in between these three bones. On the left side of the specimen, at the root of the caniniform process, the maxilla shows on its lateral wall a sutural facet which continues on to the lateral surface of the jugal. This facet must have received the anterior extension of the squamosal overlapping the former two bones laterally. The posterior part of the sub-orbital bar is missing.

The anterior rami of the pterygoids leave the maxillae, run posteriorly and meet along a midline suture behind a short interpterygoid vacuity. The vomers are not preserved but the palatines lie on the inner sides of the anterior rami of the pterygoids and terminate anteriorly against the maxillae. The ectopterygoid is missing, but there is a distinct depressed sutural facet on the lateral side of the pterygoid which is probably for the ectopterygoid. If the above observation is correct, the ectopterygoid must have been a thin sheet of bone as observed in *Dinodontosaurus* (Cox, 1968). Behind the palate, the

parasphenoid and the basisphenoid-basioccipital complex show the normal dicynodont condition. The quadrate ramus of the pterygoid, the epipterygoid and the stapes are, however, missing.

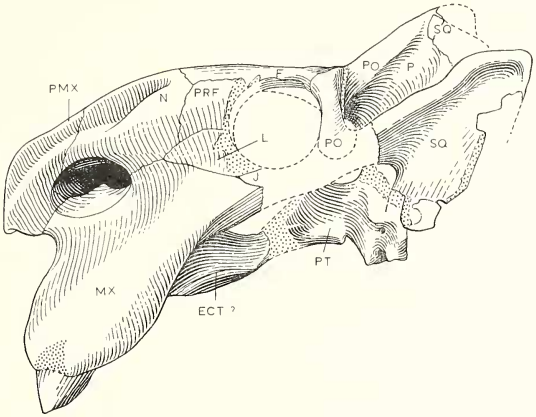


TEXT-FIG. 2. *Rechnisaurus cristarhynchus*, holotype. Ventral view of skull, $\times\frac{1}{4}$ (for abbreviations, see pp. 143–4).

Side view (text-fig. 3). The massive caniniform process of the maxilla covers most of the large tusk and only the anterior part of the tusk is visible in side view. The face is steep and high; its appearance is further accentuated by the presence of a high median dorsal ridge. The external nostrils are quite large and there is no trace of any septo-maxilla on the narial floor, the latter being formed by the maxilla. The pre-orbital region is quite long compared to the post-orbital region. Although only the postero-dorsal quarter of the orbital margin is preserved, it seems likely that the orbit was subcircular in outline. In front of the post-orbital bar, at the postero-dorsal corner of the orbit, there is a distinct bay present, formed by a notch in the frontal bone bordering the orbit.

Discussion. Cox (1965) has divided most of the Triassic dicynodonts into two families, the Kannemeyeriidae and the Stahleckeriidae. This classification is based on shape of the snout, presence or absence of a parietal crest, nature of the temporal openings, and proportion of the occiput. In *Rechnisaurus*, though the occiput is not known completely, the snout is wide and blunt, a parietal crest is absent from the short inter-temporal bar

and the temporal openings appear to be short and broad. All these features clearly indicate that this new form belongs to the Family Stahleckeriidae. On the other hand the presence of a high median ridge in the nasal region, and a prominent boss on the intertemporal bar immediately behind the pineal foramen, makes *Rechnisaurus* quite distinct from the four other Stahleckeriid genera known. Three of these genera are known from



TEXT-FIG. 3. *Rechnisaurus cristarhynchus*, holotype. Lateral view of skull, $\times \frac{1}{4}$ (for abbreviations, see pp. 143–4).

the Middle Triassic of South America: *Stahleckeria* from the Santa Maria formation of Brazil (von Huene 1935–42); *Chanaria* from the Chañares formation of Argentina (Cox 1968); and *Dinodontosaurus* common to both these formations (Cox 1965, 1968). The only African genus, *Zambiasaurus*, is known from the Middle Triassic Ntawere formation of Zambia (Cox 1969). *Rechnisaurus* is the first Stahleckeriid to be reported from Asia.

In *Stahleckeria* the snout is extremely blunt, consequently the nasals are very wide bones with a very short midline suture, the preparietal bone is absent and there is no tusk. In all these respects *Zambiasaurus*, according to Cox (1969) is quite closely related to *Stahleckeria* and may actually be ancestral to the latter. On the other hand *Dinodontosaurus* and *Chanaria* are quite distinct from the above two genera. Prominent tusks are present in the maxillae, the preparietal bone has been retained and the nasals meet along a long suture. *Rechnisaurus* appears to be closer to *Dinodontosaurus* in all those respects but differs in having a high median nasal ridge and a boss behind the pineal foramen. *Chanaria*, though showing some similarity to these two genera, has certain peculiarities such as a very smooth skull without any boss or regosities and a frontal bone with a rectangular projection into the nasal.

Genus WADIASAURUS gen. nov.

Derivation of name. In recognition of the encouragement given for the past decade by Professor D. N. Wadia, F.R.S., F.N.I., National Professor, to the Research programme of the Geological Studies Unit, Indian Statistical Institute.

Type species. Wadiasaurus indicus sp. nov.

Diagnosis. As for sole species at present.

Wadiasaurus indicus sp. nov.

Text-figs. 4–7

Material. Holotype skull; specimen I.S.I.R.38 in the collection at the Geological Museum, Indian Statistical Institute, Calcutta.

Referred specimens. One isolated maxilla, I.S.I.R.39, in the same collection and two isolated quadrate bones, I.S.I.R.40 and I.S.I.R.41.

Type locality. About 2 km. east-south-east of Yerrapalli, Pranhita-Godavari valley, Andhra Pradesh, India.

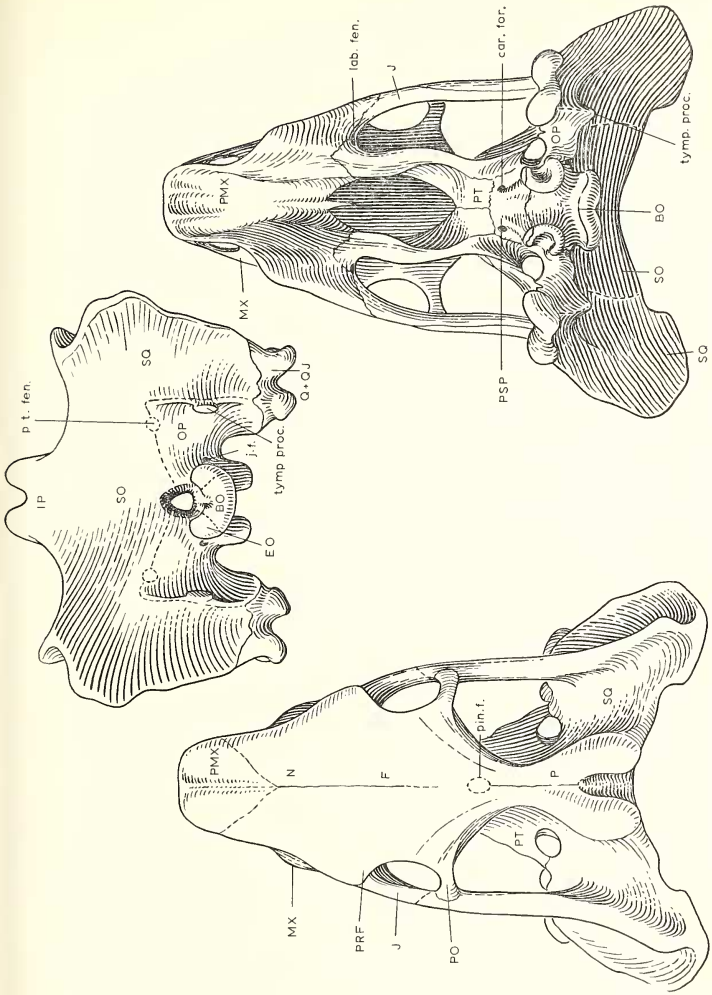
Horizon. Yerrapalli formation of the Gondwana Group, Triassic.

Diagnosis. Skull of moderately large size. Upper tusks weakly developed or absent. Skull triangular in outline, widest across occiput; gradually tapers anteriorly into a blunt snout. Maxillary flange weak, laterally compressed and projecting ventrally. Nasal ridge short, low and narrow. Inter-orbital region moderately wide. Inter-temporal bar narrow anteriorly but widens posteriorly up to the occipital margin. Parietal crest high. Temporal opening long and narrow. Zygomatic arches thin and almost parallel. Occiput faces sharply downward and backward. Lateral margins of occiput rise sharply and are subparallel. Palatal surface of premaxilla bears pair of anterior ridges. Interpterygoid vacuity wide.

The material and its preservation. The skull described here comes from the same stretch of red clays which yielded the dicynodont bones mentioned by Jain *et al.* (1964). It is of a moderately large size, 40 cm. long and 32 cm. wide across the squamosals. Although nearly complete, the skull has suffered some amount of distortion after burial and has been damaged by exposure prior to its discovery. The maxillary flanges are compressed inward, the right flange is more compressed than the left. The snout is bent slightly downward causing some displacement of the premaxilla and thus obscuring the exact suture between the premaxilla and the nasals. The central part of the skull roof has been squashed, damaging the frontals and other circumorbital bones. The pineal foramen is damaged and it is not possible to be sure whether the preparietal is present or not. The posterior half of the right side of the parietal crest has been displaced ventro-laterally causing some displacement of the bones bordering the temporal opening. The post-orbital bar is fortunately very little distorted, but the posterior extension of the post-orbital bones behind the orbits has had to be restored. The palate is the least distorted part and the displacement of the right sub-orbital bar can be corrected to give the lateral border of the skull. The left side of the palate, however, is damaged. The right side of the occipital plate is very little distorted though the left side is pushed inward and somewhat damaged. The quadrates and part of the quadrato jugals have been restored from an isolated segment found near the skull which has also been given the same specimen number in the field.

Description of the skull.

Dorsal view (text-fig. 4). The skull is triangular in outline with a somewhat narrow snout ending rather bluntly. The maxillary flanges project sharply downward and are



TEXT-FIGS. 4–6. *Wadiasaurus indicus*, holotype. 4. Dorsal view of skull, $\times\frac{1}{3}$. 5. Occipital view of skull, $\times\frac{1}{3}$. 6. Ventral view of skull, $\times\frac{1}{3}$ (for abbreviations, see pp. 143–4).

hardly visible in dorsal view. Behind the premaxilla, the skull broadens slowly up to the orbits, then the zygomatic arches run almost parallel, to be terminated at the level of the occiput by the laterally expanded squamosals which form the lateral margins of the rear of the skull.

There is a low but distinct median ridge on the premaxilla. The ridge has a groove in the middle which widens posteriorly. The inter-orbital region is not very broad, about 28% of the skull length. The orbits look mainly outward and slightly forward. The post-orbital bar lies halfway along the skull. The temporal openings are rather long, widest in the middle behind the pineal region, where the parietal crest is low and probably narrow, but the openings become slightly narrower posteriorly as the parietal crest widens progressively.

It is very difficult to distinguish sutures on the skull roof due to the extremely damaged nature of the bones and due to the presence of many erratic cracks. Many of these cracks seem to follow sutures but it is almost impossible to be sure. However, the suture between the post-orbital and the sub-orbital bar and zygomatic arch is clear.

Occipital view (text-fig. 5). The occiput is quite deep. Its dorsal half is inclined to the skull roof at an acute angle, while its ventral half becomes almost vertical; there is a transitional zone in between. This shape seems to be natural though it is possibly a little exaggerated by distortion. The posterior ends of the lateral wings of the squamosals bend inward in the dorsal half of the occiput so that the occiput as a whole has the form of a concave plate which faces postero-ventrally. The lateral margins of the occiput rise quite steeply and are sub-parallel, slightly diverging dorsally. As a result the occiput is wider dorsally than it is across the quadrates.

The occipital condyle is semicircular in outline and is weakly tripartite with an excavation on the upper surface and a clear notochordal pit. The foramen magnum is triangular in outline.

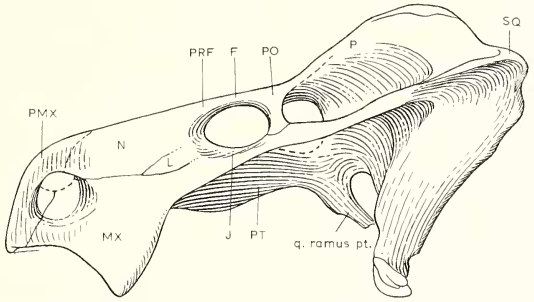
It is not possible to follow the sutures, hence the extent of the individual bones is difficult to delimit. However, the paroccipital process of the opisthotic projects laterally downwards below the level of the basiphenoid tubera. In the dorsal part of its distal end it is drawn into a posteriorly directed tympanic process.

Ventral view (text-fig. 6). The palatal face of the maxilla is marked by three anterior palatal grooves separated by two ridges. The groove in the middle is deeper but posteriorly is cut short by the convergence of the pair of ridges which meet to form a single ridge separating the continuation of the lateral grooves. The caniniform processes of the maxillae rise from the floor of the secondary palate and appear to be directed slightly outward.

There is no sign of the presence of a tusk in the maxilla in the holotype skull. However, an isolated maxilla, identical with the maxilla of the type skull except that it is somewhat smaller, has a tusk which is quite slender and rather weakly developed. Returning to the type skull, the inner margin of the caniniform process has two distinct faces: the anterior face looks medially whereas the posterior face is directed postero-medially. The former meets the premaxilla on the secondary palate and the latter meets the pterygoid-palatine process medially and the jugal process laterally.

Behind the premaxilla, the vomer and much of the palatine are highly crushed and the passage for the internal nostrils is completely obliterated beyond any possibility of restoration or description. The right anterior ramus of the pterygoid is much less

distorted and the suture between the pterygoid and the maxilla is quite clear. The labial fenestra is present in its usual position. Behind their contact with the maxillae, the pterygoids arch outward and finally make a long midline sutural contact. There is a raised prominence here, perhaps indicating the presence of a boss, as found in *Ischigualastia* (Cox 1965). Postero-laterally, the pterygoid extends behind the midline suture as



TEXT-FIG. 7. *Wadiasaurus indicus*, holotype. Lateral view of skull, $\times \frac{1}{4}$ (for abbreviations, see pp. 143–4).

the slender quadrate ramus terminating in front of the paroccipital process near the quadrate recess. Behind the pterygoids along the midline, there is a pair of carotid foramina posterior to the transverse parasphenoid-pterygoid suture. The tubera are set a little apart and their anterior faces are formed by the parasphenoid. The occiput is broadly exposed in the ventral view of the skull.

Side view (text-fig. 7). The anterior part of the parietal crest and the area around the pineal foramen have been restored, and the tilt of the parietal crest due to crushing has been corrected. The facial part of the skull is moderately long and rather low in contrast to the relatively high posterior half of the skull.

The orbits must have been oval, about 7 cm. along the antero-posterior axis, and look outward but slightly forward. The nostrils are large, rounded, and placed anteriorly just behind the tip of the snout. The premaxilla is beak-like and its anterior end rises sharply on the skull roof. Posteriorly it forms the front margin of the nostril, and meets the maxilla ventrally and the nasal postero-dorsally near the middle of the nostril. The posterior margin of the nostril is bordered by maxilla below and by nasal above and the suture between these two bones runs horizontally. When followed posteriorly this suture meets the anterior tip of the lachrymal half way between the nostril and the orbit.

On the narial floor, there is a patch of broken bits of bone resting on maxilla. These bits may be the remains of the septomaxilla but it is impossible to be sure of this. Therefore, these fragments have not been included in the figure. The lachrymal is a narrow triangular bone lying in front of the orbit. It separates the nasal and the prefrontal from the maxilla and extends to form the antero-ventral border of the orbit.

The jugal forms most of the ventral border of the orbit. Its limits at both ends are far from clear. An extensive overlap of the jugal by a thin anterior extension of the

squamosal is strongly suggested. The squamosal jugal bar is thin, compressed dorso-ventrally, and runs straight behind the orbit at a low angle, slightly rising upwards to the posterior end of the skull.

Discussion. There can be no doubt that in *Wadiasaurus*, the skull has a high parietal crest, the occiput is deep and wide, the snout is narrow with a blunt end and the temporal opening is long and narrow. These characters clearly indicate that this new form belongs to the family Kannemeyeriidae as defined by Cox (1965). *Wadiasaurus* is still very incompletely known, hence any comparison with other kannemeyeriid genera can only be very general and largely tentative.

Among the genera belonging to the family Kannemeyeriidae, *Sinokannemeyeria* and *Parakannemeyeria*, both known from the Lower Triassic Er-ma-ying formation of Shansi, China (Sun 1963), have extremely long pre-orbital regions, 46–50% of the total skull length, which makes them very distinct. The pre-orbital length of *Wadiasaurus* is more normal for the family—about 35% of the total skull length. The most widely distributed genus is *Kannemeyeria*. It is known from the lower Triassic *Cynognathus* zone of South Africa (Pearson 1924, Broom 1937), the Middle Triassic Manda beds of East Africa (Cruickshank 1965), and also from the lower Middle Triassic Puesto Viejo formation of Mendoza, Argentina (Bonaparte 1966). *Kannemeyeria* is characterized by a very narrow intertemporal bar drawn into a sharp steeply rising median crest, a situation not found in any other kannemeyeriid genera including *Wadiasaurus*. The Upper Triassic form *Placerias*, known from the Chinle formation of North America, is rather a specialized end-form with the outwardly projected caniniform processes of the maxilla drawn into a facial horn (Camp and Welles 1957, Cox 1965). A tusk is either weakly developed or absent in *Placerias* but the intertemporal bar is wide and devoid of a crest. Due to these specializations, *Placerias* also is quite distinct from *Wadiasaurus*.

The two remaining kannemeyeriid genera, *Ischigualastia*, from the Middle or Upper Triassic Ischigualasto formation of Argentina (Cox, 1965), and *Sangusaurus*, from the Middle Triassic Ntawere formation of Zambia (Cox, 1969) are however, tuskless. *Ischigualastia* differs from *Wadiasaurus* in having a pointed snout, a more anteriorly directed caniniform process and zygomatic arches which are markedly bowed outward. *Sangusaurus*, known only from its premaxilla, maxilla, and the intertemporal bar, shows some similarity with those parts of *Wadiasaurus*. The premaxilla, though generally similar in the two genera, has a pointed anterior end in the former but ends bluntly in the latter. The caniniform process of the maxilla is quite similar in the two forms but its orientation in *Sangusaurus* is not exactly known. Although the relationship between the interparietal and parietal and the exact position of the pineal foramen is not known in *Wadiasaurus*, there is some resemblance between the intertemporal bars in those two genera. In both, the inter-temporal bar widens posteriorly and their dorsal borders are concave in section. There is an abrupt change between the dorsal and occipital faces of the intertemporal bar in *Sangusaurus*, which is also, most probably, true for this region of *Wadiasaurus*.

Another kannemeyeriid genus, *Barysoma*, from the Middle Triassic Santa Maria formation of Brazil, is known very incompletely from a partial occiput and some post-cranial remains. According to Cox (1969, p. 296), *Barysoma* 'appears to be closely related to *Ischigualastia*', but any comparison of *Barysoma* with *Wadiasaurus* is not possible at this stage.

Acknowledgements. Dr. P. L. Robinson, University College, London, took a keen interest throughout the work and the paper was completed during my stay in London on an N.E.R.C. grant, given for the project 'Mesozoic vertebrates and continental sediments in Britain and India', of which the paper forms a part. I wish to thank sincerely Dr. C. B. Cox, King's College, London, for much help and useful criticism. I am also thankful to all my colleagues in the Geological Studies Unit for much help at various stages. Mr. D. Roy and Mr. A. Lee helped in completing the illustrations. Finally my thanks are due to Mr. and Mrs. N. V. Raja Reddy for hospitality in the field.

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List of abbreviations used in the figures

BO	basi-occipital	p.t. fen.	post-temporal fenestra
car. for.	carotid foramen	PAL	palatine
ECT?	ectopterygoid?	pin. f.	pineal foramen
EO	exoccipital	PMX	premaxilla
F	frontal	PO	post-orbital
IP	interparietal	PP	preparietal
J	jugal	PRF	prefrontal
L	lachrymal	PRO	prootic
lab. fen.	labial fenestra	PSP	parasphenoid-basisphenoid complex
MX	maxilla	PT	pterygoid
N	nasal	Q	quadrate
P	parietal	q.r. pt.	quadrate ramus of the pterygoid

QJ	quadratojugal	tymp. proc.	tympanic	process.
SO	supra-occipital			
SQ	squamosal			

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Typescript received 10 May 1969